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ROSE TECHNIC

Vol. XLVII January, 1938 Number 4

Member Engineering College Magazines Associated

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MARKS '35.

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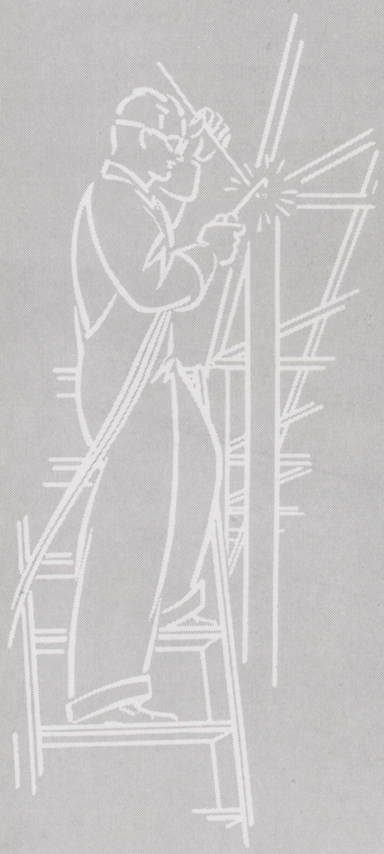

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Surveying This Issue

THE important problem of highway safety may be solved by improving its three components, the driver, the automobile, and the highway. Mr. Wilson tells briefly of what has been done to rectify each of these in this month's lead article.

ALTHOUGH photochemical reactions are not widely understood and satisfactory explanations of the mechanism of some reactions are still lacking, these reactions are of great importance. Not only does the art of photography depend on them, but the very existence of plant life depends on chemical reactions activated by energy from the sun. Mr. White explains this in his brief resume of the subject of photochemistry.

CONCERNING the current China-Japan crisis, several questions present themselves. Is Japan really the bully and aggressor that several nations would lead us to believe? Are we justified in defending China as the browbeaten underdog? What part, if any, should United States play in this crisis? Mr. Kahn gives the little-heard story of the train of events leading up to the actual crisis and his opinion as to the country really at fault.

—*M. B. S.*

THE ROSE TECHNIC

JANUARY, 1938

Engineering College Magazines Associated

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Cut Courtesy General Electric

"Path of Gold"

THE ROSE TECHNIC

THE TECHNICAL JOURNAL OF THE ROSE POLYTECHNIC INSTITUTE

Volume XLVII JANUARY, 1938 Number 4

Safety On The Highway

by

John H. Wilson, c., '38

For the past several years the appalling toll that automobile accidents have taken has been a major problem. Mr. Wilson tells of the methods used today to improve highways in order to help solve this tragic problem.

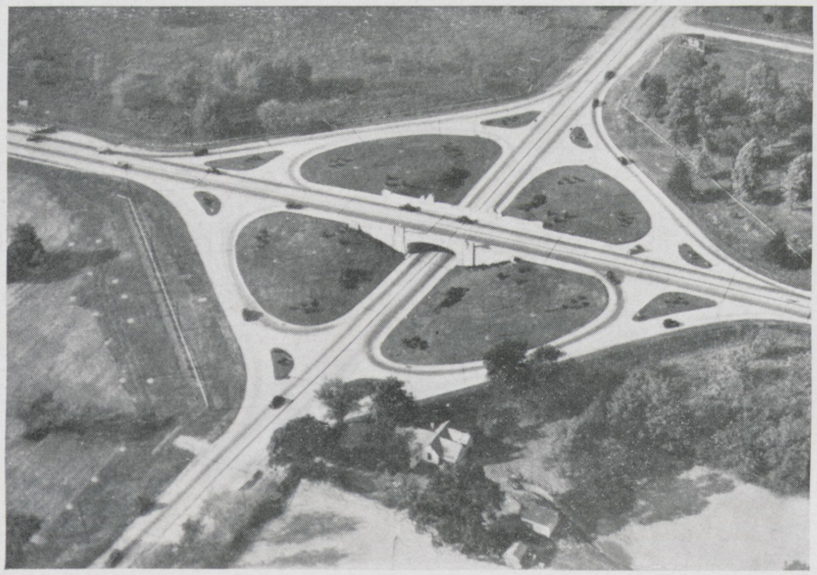
ABOUT two years ago a pamphlet, entitled "And Sudden Death", was widely circulated throughout the country in an effort to make the American public safety conscious. In cooperation with this effort a moving picture of the same name was shown at many of the theaters. Public lectures stressing safety were given, and editorials in the newspapers blasted the careless driver and the politicians who were responsible for dangerous road conditions. Signs were placed at strategic positions along the highways as reminders. All this was done to bring the horrors of automobile accidents, which took a toll of 36,000 lives in 1936, vividly to the attention of motorists and pedestrians.

At the same time that people became gradually awakened to the need for improving driving conditions, they became aware of the field known as safety engineering. There have been safety engineers in existence, as such, for about twenty years. However, it was not until a reaction, such as that created by this stress on driving safety, had taken place that the public as a whole learned of them. In the last two years the field has increased in scope and consequently in size. Today the safety engineer is an accepted, and expected, part of industrial plants, the various State Highway Commissions, and in many other places where the prevention of accidents in the manufacture or use of the products of modern industry is a serious problem.

In attempting to decrease the number of deaths due to highway mishaps, there are three general angles of approach: the improvement of the driver, the improvement of the automobile, and the improvement of the highways themselves.

Very definitely the hardest is the improvement of the driver. Every effort is made to force people to prudence in driving by demonstrating, in an impressive way, the penalties paid by those who were careless. The traffic courts have been very much more strict in their enforcement of traffic ordinances. Some have decided it might be a lesson to a traffic offender to visit the accident ward of a hospital or in extreme cases to require the careless person to visit the

morgue and view the gruesome remains of some one killed in an automobile accident. Too often these measures are in vain. Too often the driver is certain that the precautions he has read and heard about are meant only for the other fellow. When he meets another car whose driver also thinks that way, Fate may be lenient and allow him to continue on his murderous way, or she may decide to mark one or two or four more points to the score of death.



Cuts Courtesy Am. Road Builders Ass'n

A typical clover-leaf intersection

The automobile manufacturers have done all in their power to lower the death rate on the highway. In cooperation with their safety departments they have done their share toward saving lives. The new cars have better brake linings with larger braking surfaces to give quicker stopping ability. The single-unit welded steel bodies with a sheet steel roof have replaced those of wood, cloth, and chicken-wire. In case of an accident this type body acts as a box which may shake those inside, but will often withstand the shock of the collision and save the lives of the occupants. In most cars shatterproof safety-glass is being installed as standard factory equipment, eliminating the danger of flying splinters of glass. Tires have been improved to give more resistance to blowouts caused by heat induced at high speeds or by mechanical defects in manufacture and have new scientific treads to give much more road friction, thereby reducing the tendency to skid. A new type of inner tube has been manufactured which is so built that, in case of a blowout or a puncture, sufficient air will remain in the tube to cause a gradual deflation rather than a sudden one and enable the driver to bring the car to a stop on the road. These improvements, and many others, will not only help reduce the number of accidents but will reduce the incidence of serious injuries in individual cases.

In highway construction today the tendency is to design for a maximum of safety rather than a minimum of expenditure. To remove the probability of head-on collisions parkways are being placed between lanes of traffic travelling in opposite directions. In places where this is not feasible a curb just high enough to give a severe bump without actually causing injury to the car or its occupants has been placed. Wherever possible, curves, both horizontal and vertical, are being reconditioned to give longer sight distances because of today's higher speeds.

Where the money is forthcoming grade separations are being constructed. Any type when properly designed and maintained results in a high degree of safety efficiency. The one shown in the cut is known as a clover leaf intersection due to its appearance. There are no left turns necessary, although an automobile may enter from any direction and proceed in any other direction. At many

A Modern Super-highway

places where a dangerous railroad crossing exists either a highway underpass or overhead may be built. In some states the railroad is required to pay part of the construction and maintenance cost.

Old roads with narrow lanes have been resurfaced, often relocated to eliminate curve danger, and lane widths have been widened to ten feet. Wherever possible four and sometimes six lane roads have been built, and many two lane roads have been improved in this way. In a large number of states provision for parking on the shoulders has been provided. This keeps parked cars off the travelled lanes. In cities the intelligent and scientific use of stop signs and traffic signals has been instrumental in the reduction of accidents. On all roads the construction of better drainage systems has not only added to the life of the roads but has retarded the always dangerous formation of ice.

Each day some worthwhile progress is made in the fight to reduce highway deaths. It will take years to educate the public to safety and to put all the new improvements into effect, but the end of each one of those years should find fewer fatalities on the highways.

Cut Courtesy Civil Engineering

A modified clover-leaf grade separation

Photochemistry

by

Ralph A. White, ch., '38

Of what does the study of photochemistry consist? It concerns not only the chemistry of photography but many other interesting applications, as Mr. White explains in his brief resume of the subject.

PHOTOCHEMISTRY comprises the study of chemical reactions produced directly or indirectly by means of visible or near-visible radiation.

Molecular collision is the cause of ordinary chemical reactions. Only those molecules which contain abnormal amounts of energy can effect chemical reactions, and if the activation energy is large, many molecules can obtain this energy only at a very slow rate. It is possible, however, to activate molecules by means of an external source of energy; for example, by introducing a beam of light having the proper frequency to be absorbed and a sufficient quantity of energy in each photon to effect the reaction. The photon is the unit of energy in radiant form; that is, $e=hv$, where h=Planck constant, 6.55×10^{-27} erg-second, and v=frequency of radiation. That only those rays of light which are absorbed can produce chemical change follows at once from the law of conservation of energy.

According to present views, visible or ultraviolet light is absorbed by the displacement of electrons in molecules (or atoms or ions), and these high energy particles may decompose or react with other molecules. However, since favorable conditions for photochemical reaction are comparatively rare, in many cases such energy merely produces more violent molecular collisions which are manifested by dissipation of heat.

Quantitative Considerations

According to the Einstein Law of photochemical equivalence, in the primary photochemical process each molecule is activated by the absorption of one photon of radiation. Therefore, since $e=hv$, the energy per "einstein", per mole of photons, is obtained by multiplying hv by the Avogadro number, N.

$U=N\ hv$ calories per mole where,

$N=6.06 \times 10^{23}$

h and v are the same as above.

The Avogadro number is the number of molecules in one gram mole of a substance and is equal to 6.06×10^{23}. One gram mole is the weight of a substance in grams equal to the molecular weight of that particular substance. According to the Einstein Law, each molecule is activated by one quantum

of radiation; therefore, one gram-molecule is activated by 6.06×10^{23} quanta. This "gram-molecule" of quanta is called the "einstein."

The following table gives values for U corresponding to radiations of definite wavelength.:

Color of Light	*Wavelength in Angstroms*	*Calories Absorbed per mole, U*
Infra-red	10,000	28,450
Red	7,000	40,700
Orange	6,200	45,900
Yellow	5,800	49,070
Green	5,300	53,800
Violet	4,200	67,760
Ultra-violet	2,000	142,300

It will be observed that U decreases rapidly with an increasing wavelength. This explains the fact that in many photochemical reactions short wavelengths are of greater effectiveness.

Conversely, the number of moles of reactant that would theoretically be decomposed by each calorie of absorbed radiation is given by the equation

$$\frac{1}{U} = P \text{ moles per calorie}$$

If the experimentally observed number of moles decomposed in any particular reaction is Φ, then Φ/p gives the quantum yield of the reaction, a value represented by Y. If Einstein's Law were rigidly obeyed, Y would be unity; however, this is rarely found to be the case. The law applies only to primary photochemical reactions, which are usually masked by secondary reactions or are effected by complicating circumstances. That is, the activated molecules may lose energy by collisions or by fluorescence or by internal rearrangements and loss as heat. Also, dissociated particles may recombine to give apparently low yields.

The quanta yields of a few simple decompositions are given in the following table:

Photochemical Decomposition	*Wavelength in Angstroms*	*Quantum Yield Y*
Hydrogen iodide	2070	1.98
	2530	2.08
	2820	2.10
Hydrogen bromide	2070-2820	1.97-2.08
Nitrosyl chloride	3650-6300	2.1
Chlorine monoxide	4600	2.1-2.5
Ozone	2090	3.1

Although the quantity of light absorbed is proportional to the intensity of the light, experiment shows that the quantum yield tends to fall with an increase in the intensity of the incident light.

Types of Photochemical Reactions

Reactions that are influenced photochemically may be divided into two general groups depending upon whether they are accompanied by a decrease or by an increase of free energy. (Free energy is a measure of the net work that is accomplished by a given chemical reaction). In the first case light acts as an accelerator, and a small amount of light energy may produce a very appreciable chemical effect. In a balanced reaction, however, the condition of equilibrium is not disturbed, and the light may be compared to a catalyst, realizing that since the light supplies a certain amount of energy the analogy is not perfect.

Reactions which upon absorption of light are characterized by an increase in free energy are of great biological importance, and since the light supplies the necessary chemical energy, there must be a relatively large absorption. Examples are afforded by the various photosyntheses that occur in the green leaves of plants whereby starch, sugar, and other complex substances are produced.

Photochemical changes are possible in systems which are ordinarily not sensitive to light, provided that a small quantity of sensitizer is present which can absorb the light and produce the reaction without apparently taking part in it. Thus, chlorophyll, a complex organic compound containing magnesium, which gives plants their green color, acts as a photosensitizer. It absorbs both red and blue light, and the activated chlorophyll thus formed produces the starting material of all plant growth from carbon dioxide and water. Such a reaction has been found to absorb at least 112,000 calories per mole, an amount of energy corresponding to a wave length of 2300 Angströms or less. Short ultra-violet light has such a wavelength, but there is no radiation of this type in amounts large enough to produce an appreciable effect in the sun's radiation that reaches the surface of the earth. Therefore, the conclusion has been reached that the process consists of a series of chemical reactions, each requiring the absorption of one unit of radiation; however, a satisfactory explanation of the mechanism is still lacking. Despite this fact, the following equation may be used to represent the reaction:

$$CO_2 + H_2O + h\nu + \text{chlorophyll} = (CH_2O) + O_2 + \text{chlorophyll}$$

The primary product, possibly an aldehyde, has only a momentary existence, for it is immediately converted into cellulose and other carbohydrates together with the numerous materials of which the plant is composed.

Photography

A photographic plate consists of a large number of minute grains of silver halide dispersed in gelatin. When such a plate is given a very brief exposure to light and is then treated with a mild reducing agent, such as pyrogallic acid, the exposed particles are reduced to metallic silver more rapidly than the unexposed parts. Apparently it is necessary for a quantum of energy to strike a sensitive spot in the crystal lattice for such reduction to take place. Minute impurities of silver sulphide seem to be identified with these more sensitive spots.

The camera focuses the image of the object on the photographic plate; the brightest parts of the image have a greater concentration of quanta, and consequently more grains are reduced to silver. The unaffected grains are washed

out with sodium thiosulphate. Thus, the bright parts of the image become the dark spots on the plate, and the plate is therefore called a negative.

In printing, the negative is placed over a paper coated with silver halide and exposed to light. The dark spots on the negative absorb light, while the unaffected do not, thus producing a negative of the first negative. This double reversal produces a true print in which the dark and light parts agree with those of the original object.

The silver halides respond only to the shorter wavelengths of the visible spectrum and to ultra-violet radiations, but by incorporating in the plate certain red dyes, such as dicyanin, the plate becomes sensitive to red. Such plates are called panchromatic plates and give much better tone values to colored objects. Since red light is less refracted than blue, red-sensitive plates with a blue filter will give much clearer pictures of distant objects through a hazy atmosphere. This principle has been extensively applied in aerial photography.

Summary

A consideration of the facts presented in the preceding paragraphs will prove that, although photochemical reactions are not widely known or understood, they are of great importance. A recent advance of biological importance is the production of vitamin D by photochemical means. The process involves the treatment of ergosterol with ultra-violet light.

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In Defense of Japan

by

Robert S. Kahn, ch., '39

In keeping with an editorial policy which calls for the impartial presentation of controversial subjects we present a little-heard side of the current Far Eastern crisis. If you disagree with Mr. Kahn's analysis why not send the Editor your own views?

With the United States on the brink of becoming entangled in an Oriental conflict, it behooves the American public to be less gullible and more inquisitive—to questioningly look beneath the surface of affairs as they have been publicly presented. Japan has been condemned, for certain selfish reasons, as the bully and the aggressor, and China has been defended as the browbeaten underdog. Americans are prone to take snap judgment, and certain interests were quick to see and take advantage of this weakness. The sympathies of the public have been played upon to embitter it against Japan. Only half of the story has been told, and that has been deliberately distorted.

To get the proper perspective on this situation it is necessary to go back several decades and briefly review events leading up to the present Sino-Japanese crisis. For forty years Japan has endeavored to establish friendly relationships with China for the ultimate benefit of both. At the turn of the century, China had already allowed herself to become corrupted by European influence. In 1904-5, Japan struggled to save both China and herself from the Czarist Russian menace. This action necessarily involved the sacrifice of men and money for which Japan received nothing from China and a few insignificant concessions from Russia. Just as tiny Cuba, corrupt and backward, was a menace to the powerful United States, so a corrupt, Western-dominated China was an infinitely greater menace to little Japan. For this reason, then, Japan, simulating our own Monroe Doctrine, made sacrifices to drive Russia out of Manchuria. At the close of the war Japan hoped that China would take advantage of the situation and attempt a proper internal rearrangement. But China balked. She conspired with the larger occidental powers because she thought them better able to aid her.

At the Washington Conference in 1921, Japan again made great concessions in an attempt to befriend China. Japan returned to China her interests in Shantung, though she had acquired them from Germany, not China. Japan gave up her rights in Manchuria and even removed her troops from certain parts of China where they were needed to protect Japanese nationals.

Japan followed the policies agreed upon at the Washington Conference even more closely than did some of the other powers. She helped to restore China's tariff autonomy and made it known that she would relinquish her extra-territorial rights in China. When bandits captured and held for ransom passengers on a Chinese train in 1923, certain foreign powers proposed foreign policing of Chinese railways. Japan nipped this insidious plan in the bud by her vehement objection to the proposal. Had not Japan objected, China would probably have lost control of her own railways.

To all this proffered friendship China responded only with flat rebuff and abrogation of its treaty of commerce with Japan. China added insult to injury by scrapping numerous agreements defining

Japan's rights in Manchuria. This action led quite naturally to secession and founding of a new state, Manchoukuo. Thirty years of continuous obstinacy and antagonism were responsible.

The present crisis began when Nationalist China allied herself with the Red forces of Communist Imperialism. The Nationalist Government, under Generalissimo Chiang Kaishek, is definitely militaristic, and, like all other militaristic imperialisms, it depends upon wars for its very existence. On July 7, 1937, some 150 Japanese soldiers were engaged in their usual maneuvers near Marco Polo Bridge in Peiping, and, as always, the Chinese authorities had been previously notified. The soldiers carried no live ammunition—only blanks. At 11:40 P. M. that evening, this small group of Japanese soldiers was fired upon by Chinese troops. Having only blanks, they could not return fire and had to retreat until reinforcements arrived. Then the Japanese responded to the Chinese fire. Immediately a Sino-Japanese mediation board was dispatched to the scene of encounter, and the fighting was stopped at 6 A. M. At 3 P. M. and again at 6 P. M. on July 8 the Chinese soldiers resumed firing. A truce was arranged the next morning, only to be broken again by the Chinese on the following day. An agreement was finally reached again, and hostilities ceased.

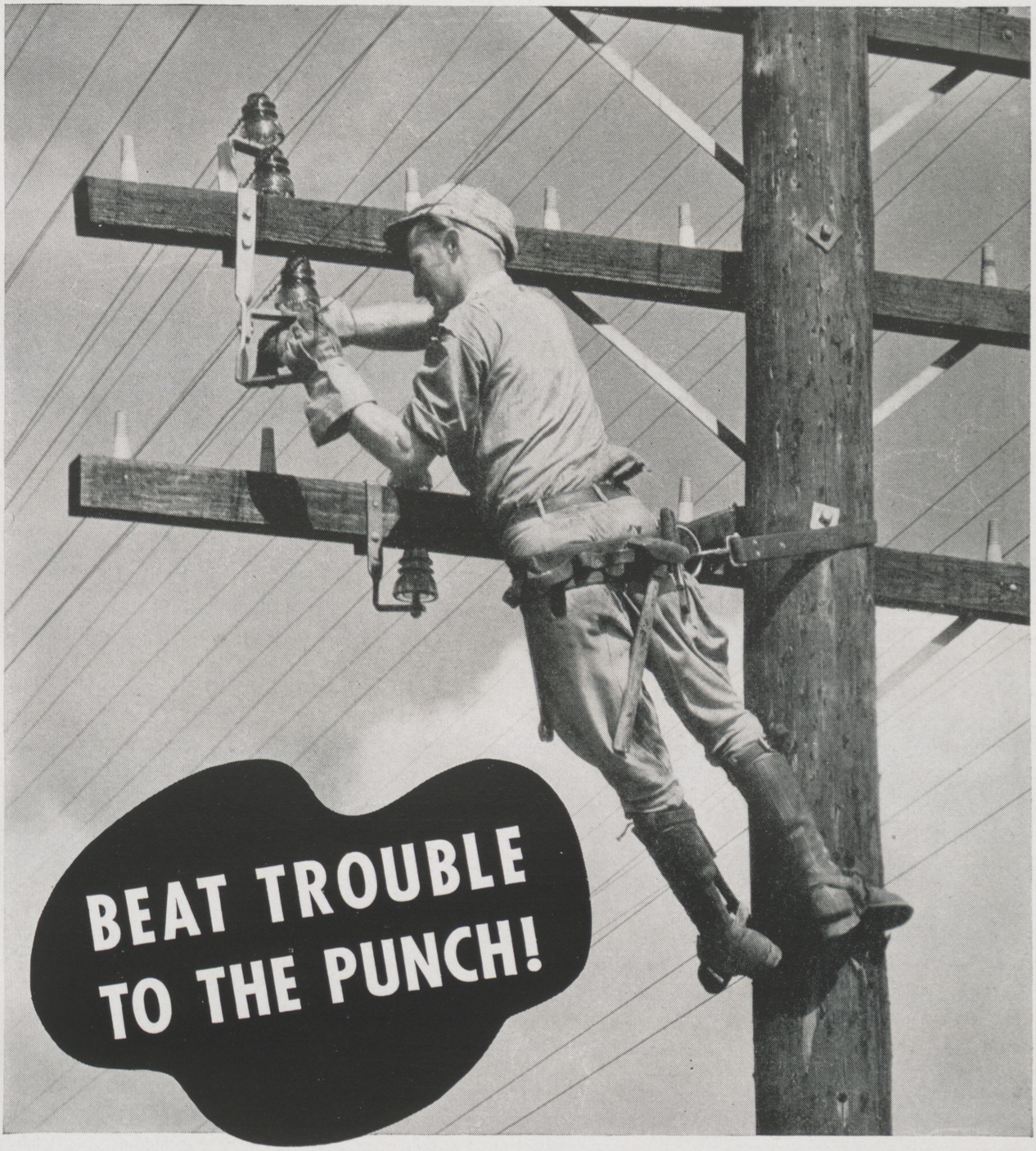
But Generalissimo Chiang Kaishek at Nanking had been bent upon provoking war. He decided to strike at the most advantageous time—before Japanese military preparations could be completed. He had exaggerated the significance of certain events and jumped to the conclusion that China had more than an even chance to win a war with Japan. Many of Chiang's observations were, moreover, correct. China had, for instance, an army eleven or twelve times as large as that of the Japanese. It also had many tanks, airplanes, machine guns, and other implements of modern warfare. At any rate, the Nanking Government lost no time in sending troops to the North.

When trouble breaks out in the North of China, it soon spreads to the South, especially to Shanghai. The reason for this is obvious; it is simple military strategy. In order to divide and weaken the Japanese Army in North China, Chinese strategists deliberately created a disturbance in Shanghai. A Japanese naval officer and his aide were murdered, while riding along a road in the International Settlement, by a group of Chinese soldiers acting under the guise of Peace Preservation Officers. In a final effort for peace. instructions were given to keep cool, and Japan landed no marines. On the day following the murder, a conference was called at Shanghai, China being represented by the Mayor of Shanghai who promised that he would do all in his power to effect a peaceable settlement. The next day, however, Mayor Yui, under pressure from Nanking, said he was "powerless" and "could do nothing". The situation went from bad to worse, and soon the war was on. The rest we know only from what we have read in the American newspapers.

In addition to the moral reasons, there are very pertinent economic reasons for America to cease its unjustified censure of Japan. Japan is, perhaps, America's best customer. It buys more American goods than China and all the rest of Asia, in addition to New Zealand, Australia, Batavia, Borneo, and Sumatra. Japan buys more from this country than all of South America. Furthermore, Japan, unlike China, buys more from America than she sells to it. In certain years Japan has bought twice as much from America as she has sold to it. In 1936 Japan bought $204,-190,000 worth of American goods while America bought only $172,-400,000 worth from Japan. In the same year China purchased $46,-430,000 worth of American merchandise and her sales to America totaled $73,000,000. These figures become meaningful when we realize the importance of maintaining a favorable trade balance.

It is obvious, then, that the American public has been the object of a campaign of organized lies and intentionally misconstrued statements. London and Paris particularly have endeavored to paint Japan as a black-souled villain. The Chinese government has not only censored newspaper dispatches, but in many cases it has actually changed the wording of them. These facts, coupled with the efforts of certain industrial groups to incite American enmity toward Japan, are definitely detrimental, not only to a true understanding of the situation, but also to our policy by acclamation of strict non-intervention.

We have seen that for four decades Japan has endeavored to befriend a corrupt and backward China who has constantly rebuffed her benefactor. We have seen that the present crisis was precipitated by an aggressive combination of the Communist Imperial and National Militaristic Governments of China. Japan pleaded for peace, but the Red-White avalanche of man power struck nevertheless. Four times Japan arranged truces, and four times China broke them. We have seen China, conniving with certain powerful foreign financial interests, attempting to draw foreign nations into the conflict by actions in the Shanghai International Settlement, by insidious propaganda, and by distorting and mutilating the facts before the Western world could read them. We see on our ledgers a favorable trade balance with Japan and an unfavorable one with China. All of these facts, when mentally oriented, should at least make the American public think before it acts, and if they will but take time to hear an appeal to reason, the citizens of the United States are mentally intelligent and morally upright enough to act judiciously and in a manner they will not later regret.



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Integrity

No better compliment can be given a man than to say, "His word is good; you can always believe him." This compliment is paid only to men who have shown by past actions that they are guided by a fine sense of personal integrity.

Real success can be achieved only by truthfulness—by strict adherence to thorough-going honesty in facing facts as they really are. A man may be able to bluff his employer for a while, but sooner or later his bluff will be discovered. The entire engineering profession is built upon the integrity of its members; therefore, it is important for the young engineer to form the habit of telling the truth and despising the practice of compromising with his conscience. An engineer's report on any dispute is the same for either the plaintiff or the defendant.

A few students have developed the bad habit of cribbing on examinations. Even though this may seem to be a little thing at the time it is started, the habit sometimes develops to the point where the victim is unable to face the prospect of an examination, supposedly in fair competition with his fellows, without his crib sheet. Men who use such tactics will never become dependable engineers, and the profession would be better off without them. The man who does not cheat on an examination, even though it means a lower grade for him, is not only keeping himself from falling into a bad habit. He is developing within himself that intellectual honesty which is the true mark of a man worthy to be called an engineer.

Thinking

The ability to think clearly is an important asset to a man in any type of endeavor. In reality this ability is not natural with anyone but rather every person must develop it by actually using the limited capabilities which he may possess.

In engineering, especially, clear thinking is important. Before any work can be done on building a machine, the whole design must be finished in the imagination of the designing engineers. Even a small mistake on the part of these engineers may result in a large loss to the company when construction of the machine has started.

Most of the subjects given in engineering schools are arranged so that some real thinking and not just memorizing is required of the student. Now is the time to start the development of your thinking ability. Work at it constantly. Not only will this practice mean a great deal to you while you are in school but the real rewards will come after you are through school and are working in active competition with the best engineering minds of your generation.

Shortcomings of Graduate Engineers

In the article "What Industry Wants of Its Chemists" by H. A. Galt appearing in a recent issue of the Journal of Chemical Education the faults of graduate chemists were summarized as follows:

1. There are few leaders and original thinkers in the group; this is the most serious shortcoming of all.

2. They have practically no knowledge of economic values. Depreciation, overhead, operation costs, return on investment, etc., are all matters of another world. The training should relate more to economic phases of industrial chemistry. School problems should contain more dollar marks, ton, and carload figures.

3. Many graduates are satisfied with mediocre performance from themselves. They are capable of doing good work, but are not willing to put forth the additional effort that makes the difference between "fair" and "very good". This is partly due to too many "activities" in school which reduce the amount of time available for studies to a point where one devotes a minimum of time and effort to his work.

4. They are too much inclined to do good work only when their duties are pleasant. They should realize that they have to make good on **every** job before they move to something better.

Although this article was written primarily for the benefit of chemical engineers, the points enumerated above apply directly to students in all branches of engineering and should be accepted without question. The student should consider them seriously, keeping in mind the fact that some day he will no longer be required to please a teacher but necessarily will be required to please an employer.

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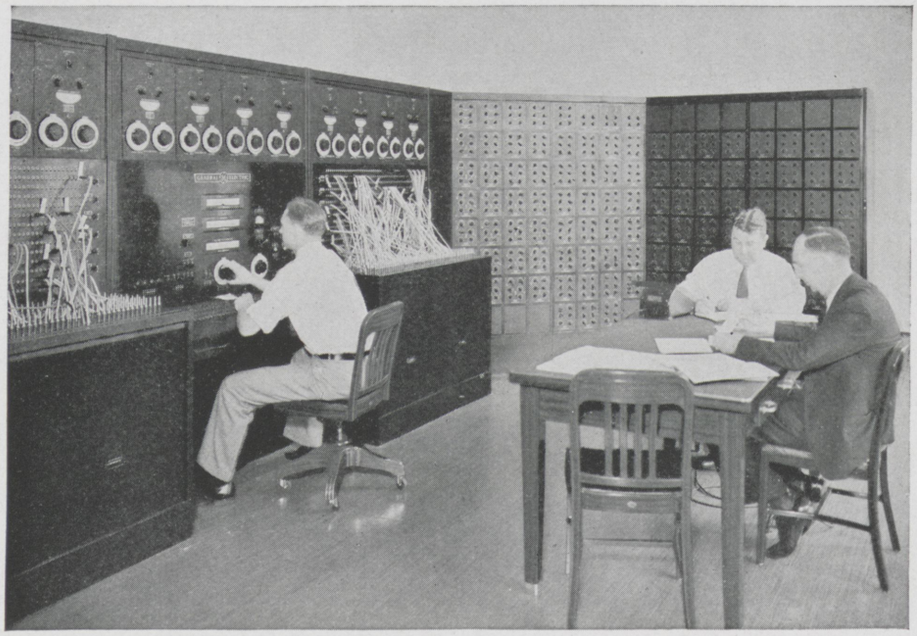
Research and Progress

edited by
Lawrence J. Giacoletto, e., '38



Cut Courtesy G. E.

"Electric Problem Solver"

Network Analyzer

Complete operating conditions of many electrical plants can be simulated by a network analyzer recently built. A network analyzer consists of a multitude of resistive and reactive circuit elements which are variable to any desired value. These elements are connected to correspond to the actual conditions. Correct voltages are then connected and current, voltage and power are measured at various points in the network.

The a.c. network analyzer pictured above is 26 feet across and 11 feet deep. The upper parts of the three center cabinets contain the 480-cycle generator units. The master instruments for making circuit measurements are located in the center cabinet. These instruments consisting of ammeter, voltmeter, and wattmeter-varmeter are of the light-beam type and have moving parts which are highly damped to permit rapid measurements. By the use of these instruments, direct measurements may be made of phase angles as well as magnitudes of components of voltage, current, and power in any branch of the network. Accurate current and voltage amplifiers are used with the instruments so that their insertion in a network will produce a negligible effect on the distribution of voltage and current in the other branches of the network. The instruments including voltage dividers, current shunts, and amplifiers are accurate within 0.5 percent.

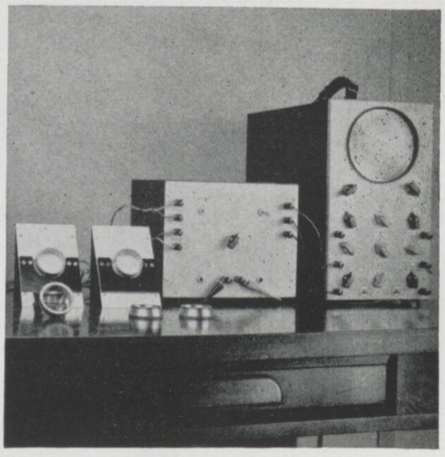
The 300 network units terminate in jacks and plugs with flexible cords on the connecting cabinets, situated on each side of the instrument cabinet. The desired connections of the network being simulated are formed by inserting the plugs in the jacks of the vertical jack panels. Telephone-type key switches permit metering of any part of the network.

The network analyzer has been used to simulate the conditions existing in power systems of large sizes and complexities. Thus quantitative measurements which would be tedious and well-nigh impossible to calculate otherwise can be obtained with greater assurance as to their accuracy. The analyzer can be operated by one person; as many as 500 readings have been taken in two hours.

Visual Material Testing

In industrial operation, the quick and accurate testing of materials is highly important. In this case, the problem was to differentiate between samples of magnetic materials some of which were of the desired composition and others which contained undesirable chemicals. Ocular inspection of the samples, of course, showed them to be identical. It was therefore necessary to utilize the change in magnetic properties with composition for discriminating between the good and bad material.

With the aid of an oscillograph it is possible to produce characteristic cyclogram patterns which are dependent on the magnetic characteristic of the samples being tested. The complete material tester for analyzing magnetic samples is shown in Figure 1. Typical cyclograms obtained by the tester are shown in Figure 2. In the latter figure, the pattern at the left is that of the acceptable sample; the right pattern is that of a faulty sample. The instrument is first calibrated with a standard sample

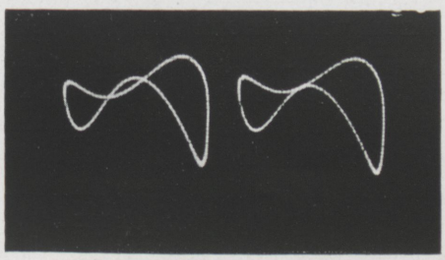


Cuts Courtesy DuMont Oscillographer

Complete Material Tester

by adjusting the deflection until the lobes just touch. Once adjusted, the testing is simple, positive, and can be performed quite rapidly. Another feature of the setup is that by observation of the pattern, the direction of departure as well as the magnitude can be noted. Thus overlapping of the lobes indicates too strong a concentration of certain elements, while failure of the lobes to touch indicates underconcentration of the same constituents.

The same method can be used for detecting variations in samples brought about by different methods of processing as well as variations in hardness, aging, and firing. The same principles can be applied for testing materials which have critical magnetic, dielectric, or conductive properties. The oscillographic method of testing is superior to many meter type indicators in that a serious deviation from normal does not harm the instrument.



Cyclograms of Materials

Flow of Water in Pipe Bends

New facts of value concerning the flow of water in pipe bends were discovered by the late David L. Yarnell of the Drainage Division, U. S. Bureau of Agricultural Engineering. The results are reported in detail, with charts and photographs of experimental setups, in U. S. Department of Agriculture Technical Bulletin 577, "Flow of Water Through 6-inch Pipe Bends". The investigations covered bends of various degrees and included studies of velocity, pressures, and currents in upstream and downstream tangents as well as in the bends. All bends were found to obstruct flow more than an equal length of straight pipe.

Some of the conclusions drawn by Mr. Yarnell from his studies are as follows:

(1) The velocities of the filaments of flow along the inner side of the bend are increased and those along the outer side are decreased in their approach to the bend.

(2) The loss of head increases with increase in length of the bend for pipe of equal size, equal radius of curvature, and like material and condition, and is greatest for a miter bend made by joining directly two straight pieces of pipe cut obliquely, with no intervening curved section.

(3) For a given pipe bend and given quantity of flow, the head lost in the bend is influenced greatly by the velocity distribution in the part of the pipe at the approach to the bend.

(4) From the difference between the pressures on the inner and outer sides of a bend at the point of maximum difference, and having given the size of pipe and the radius of curvature of the bend, it is possible to compute the mean velocity and therefore the quantity of flow. In other words, when a pipe bend has been calibrated it may be used as a flow meter with which the discharge can be determined merely by measuring the difference in pressure of the inner and outer sides.

(5) The losses in the pipe bends used in these experiments appear to vary as the square of the velocity, and not as the 2.25 power as suggested by some writers.

The report of the investigation includes several practical applications of the results. Thus since a single pressure reading on a bend or close to a bend may not give the correct average pressure for the cross section at that point, it is recommended that in such work as making efficiency tests on pumps, the pressure determinations should be averaged over several points on any section. Since the experiments showed much greater loss of head in bends of reverse curvature than those of continuous curvature, it is emphasized as advantageous in all pipe installations to avoid, as far as practicable, the reversal of direction of curvature by bends placed near together. It is suggested that in most installations at least one pipe bend can be calibrated for use as a flow meter and a manometer constructed by which discharge of the pipe can be read directly. From the results on loss of head resulting from the lack of uniformity in velocity in the approach to bends, it is clear that in planning pipe lay-outs if two bends on the same line curve in the same direction, the second will cause less loss of head than the first if they can be placed close together.

12-inch Television Tube

The tests were made on sections of celluloid pipe. Bends in cast-iron pipe would cause greater loss of head because of the greater roughness of the inner walls. However the relative effects should be the same in both cases.

Television Tube

Whether or not television is just around the corner may be a conjecturable matter, but technical research is still being extensively carried out on this subject. Most engineers are agreed that whenever television is made available to the public, a cathode ray tube will be used for duplicating the image

at the receiver. In the figure above is shown one of the larger cathode ray tubes used in television reception. It has a 12-inch diameter screen. The tube has been especially designed to prevent defocusing of the spot when the video signal modulates the tube. Electrostatic focusing of the electron beam as well as electrostatic deflection is employed in preference to electromagnetic methods.

New Jersey to New York By Tunnel

The Borough of Manhattan is an island 13 miles long and averaging about 2 miles in width. Across the Hudson river from Manhattan lies the state of New Jersey. Last year, 31,500,000 vehicles made the crossing between the states of New York and New Jersey. To facilitate this traffic, these two states had previously financed and built the Holland Tunnel under the Hudson and the George Washington Bridge over the same river. About 60 per cent of the vehicles utilized the Holland Tunnel and the George Washington Bridge in crossing the Hudson last year. The remainder were transported across by ferries. Between the Holland tunnel and the George Washington Bridge is an interval of 10 miles. It so happens that the center of traffic lies about midway between these two crossings. Thus it is necessary that the traffic either use ferry facilities or drive north or south to use the Holland Tunnel or the George Washington Bridge. A careful study of the traffic problems involved seemed to warrant the construction of a second tunnel at the midway point.

Thus the Lincoln Tunnel, a twin-tube vehicular tunnel joining West 39th Street in Manhattan to Weehawken, New Jersey, was begun in March, 1934. In order to reduce the initial financial outlay, work was concentrated on one of the two tubes. The one tube providing single lane traffic in both directions was ready for service in December, 1937. The one tube will thus be earning money while the second tube is being built. With two tubes (the second to be completed in 1940), two lane traffic in both directions will be possible. It is estimated that in a single year the two tubes will handle traffic totaling 10,000,000 and more vehicles. The Lincoln Tunnel, when completed will have cost $74,800,000.

On the other side of Manhattan Island is the East River which separates the Borough of Manhattan from the City of Greater New York. It was recognized that to assist traffic into Manhattan and not otherwise to improve the route to New York would not better the overall traffic problem. Therefore in order to accelerate through traffic from New Jersey and New York City, authority was given for the construction of the Queens-Midtown Tunnel crossing under the East River between 42nd street, Manhattan and Borden Avenue, on the water front of Queens. Work on this twin-tube tunnel will start in January, 1938 and will probably cost, when completed, $58,365,000. The tunnel should be available in 1940, and it is expected to handle 10,500,000 vehicles in the first year with the traffic expected to expand to 15,000,000 vehicles yearly.

With the two tunnel systems linking to Manhattan on the east and west, a serious traffic problem would result for the crosstown streets of Manhattan. To remedy this future difficulty, the Borough of Manhattan has been authorized by the New York State Legislature to construct twin connecting tunnels. Thus while it will be possible for the Manhattan drivers to use either the Lincoln or the Queens-Midtown Tunnels, those vehicles which wish to travel straight through from New Jersey to Long Island can do so without affecting Manhattan traffic. The Manhattan tunnel will cost $30,000,000, and it is hoped that work will start on it soon so that it too will be available in 1940.

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Sports

edited by
Robert N. Ladson, ch., '39

At the conclusion of the most successful football season in several years the student athletic board, acting with the recommendations of Coach Brown, awarded major letters and sweaters to the following men:

Seniors—Captain Stanfield, fullback; Zinngrabe, end; Wilson, guard; Eckerman, end.

Juniors—Smith, halfback; McKee, quarterback; Ladson, halfback.

Sophomores — Montgomery, tackle; Eder, guard; Mitchell, center; Palisin, end; Smilanic, guard.

Freshmen — Harper, halfback; Menefee, tackle; Bobbitt, tackle; Combs, guard; Rustamier, quarterback; Hogan, tackle.

Robert, "Rosie" Colwell, backfield ace, who sustained a fractured collar bone in the second game of the season, was awarded an honorary letter. Kenneth Buis and John Hayes, senior managers, also were given letters and sweaters for their service to the team.

George Smith, junior halfback from Prairieton, Indiana, was elected Captain of the 1938 team to succeed Stanfield. George began to play football in his sophomore year more as an experiment than anything else. He had previously played basketball but had never indulged in the sport of chasing the football around the gridiron. He developed so rapidly that this year he was regular right halfback. He is a fine leader of men and should prove to be an excellent captain.

Basketball Begins

On Monday, November 29, 1937, the new edition of the Rose Engineer basketball team met for the first time. Approximately thirty erstwhile players reported for this first practice session, but the number has since dwindled to a total of eighteen. This is a fairly large squad of players and offers Coach Brown a group of about the right size with which to work.

Captain Ed Eckerman is back again to lead the team. Also returning to the squad are Smith, Egloff, Colwell, Wolf, and Ladson, letter winners from last season. These men are all from the football team and consequently obtained a late start in comparison to players in other schools who have been practicing since November 1. The freshman class also has some good men to offer. At this time Dreher looks like the most promising prospect. He is tall and has a remarkable eye for the basket. Other freshmen who have seen service and who will undoubtedly continue are Harper, Kerns, and Reel. Forsythe and White are also showing up well in each game. The squad is hampered by lack of practice but will develop into a good team before long.

Rose vs. DePauw

On Thursday, December 2, the team, fresh from the football field, undertook to tame the Tigers of DePauw. For the first half the Engineers displayed very good basketball, but they faltered during the second half and lost 48-29.

The game was played under very severe handicaps for the Rose team. They had practiced only three times together and consequently the play was somewhat ragged. To top this, the Rose team had to familiarize themselves with the new rules and this proved to be hard to do.

During the first half the DePauw team used a fast break to good advantage but were unable to outscore the Rose team. The Engineers employed a slow break most of this half and had very good luck with their shots. The score at the half stood at 20-18, DePauw.

In the second half the Rose team faltered considerably and were unable to match shots with the Tigers. Smith, extra-fine defensive man for Rose, was lost to the team this half due to the personal foul rule, and the defense went to pieces. DePauw time and again charged down the floor ahead of the tiring Rose defense to score over the head of Captain Eckerman, who played a fine game throughout. In this half also Rose Poly had bad luck on their shots as they rolled out instead of in. The score at the end of the game was 48-29 in favor of DePauw.

Colwell was the high scorer with six points, and Eckerman next

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with five. In addition Eckerman played a sterling defensive game.

Rose vs. Earlham

On Thursday, December 9, Earlham College was host to Rose and played remarkable basketball to win 52-26. This is quite a large score but does not indicate the fight that the Engineers showed. Earlham had substitutes that were fully as good as the starting five, and these men demoralized Rose and ran up a considerable score.

Hardin, Bull, and Peters were the main reasons for the downfall of Rose, and, on that particular night, they were unstoppable. The first half was an exciting one because Earlham used a very fast breaking offense time and again to score. Rose Poly had plenty of shots at the basket but could not connect. As in the previous game, Rose used the slow-breaking offense that was so successful last season, but the total lack of shooting ability kept the score low.

In the second half Rose came back with much determination and were able to fight on equal terms with the "Quakers" for about ten minutes. At this point the Earlham coach inserted a whole new team much to the chagrin of the Rose team. With this new combination of vibrant energy Earlham gradually pulled away again. The score at the end of the game was 52-26, Earlham.

Offensively Colwell was the best Rose cager with seven points. Kerns and Wolf came next with two field goals apiece to score four points. Captain Eckerman was the best defensive man. Reel, 5 foot forward, entered the game in the middle of the last half and was able to garner two points, and at the same time, put some life in the Rose team.

Rose vs. Wabash

On Thursday, December 16, the Rose team, still playing away from home, traveled to Crawfordsville, Indiana, to play Wabash College. The team showed much improvement over the performance in previous games, but was defeated 49-28. It seems that the Wabash athletic teams have some sort of jinx over Engineer teams because they always manage to reach new heights to win over Rose. After the game, Pete Vaughn, Wabash coach, confessed that his team was unusually torrid in their shooting on that particular occasion.

The first half started slowly with both teams playing conservative basketball. Each team seemed afraid to open up in this first half. However, near the end of the half, Rose "engineered" a couple of fast breaks that caught Wabash off guard and were good for two points each time. At the half Wabash led 19-11, due to a couple of long shots by James, flashy forward for Wabash.

In the second half the play was very similar to the preceding period. Neither team was willing to take many chances. Wabash was content to protect its lead, while Rose attempted to work the ball in for short shots. The game ended with Wabash ahead 49-28.

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Campus Activities

edited by
J. Edward Taylor,
ch., '40

Good News

There are other kinds of good news beside no news. When, after a too-long interval, we are once more permitted to see a face and hear a voice that have remained in our memory, that is the best kind of news.

We gathered that kind of news when Edd A. Coons, ex-'37, whose promising career at Rose was temporarily delayed by misfortune, passed through from his home in Mattoon, Illinois. He had obtained leave to attend his father's funeral and was on his way back to the Walter Reed Hospital in Washington where he has been confined for the last eighteen months.

The host of friends on hand were overjoyed when his train came in to note that he was able to step to the platform to greet them. He will be back next September. We wish it were August, Edd.

Toulmin Award

Last year Colonel H. A. Toulmin Jr., of Dayton, Ohio, established at Rose an award of a gold medal to be presented annually at the commencement exercises for the most creditable paper on some phase of the general subject of invention. The competition is directed by a committee of the faculty and a specific topic is announced in the fall of each year for the papers to be submitted in the following spring.

Recently Professor Berton A. Howlett, chairman of the faculty committee, announced the title for the 1938 paper. It is: "The Effects of Inventions on Employment." Any Rose student is eligible to submit a paper in this competition, provided he has not previously received the award. This excellent extra-curricular intellectual activity should merit serious consideration from the student body if only because of the inestimable worth of the practice it necessitates in the organization and presentation of technical and social data. Anyone intending to prepare a paper should not overlook the point that he is required to register the intention with the committee before February 1, 1938.

Assembly

At the latest assembly on Thursday, December 9, Professor Knipmeyer marked another mile-stone as having been overtaken in the production of the 1938 Rose Show by announcing the complete working committee. The election of Willard Louthen, sophomore, as group chairman for the department of physics completed the list. Professor Knipmeyer spoke in lieu of George R. Armstrong, Rose, '21, and superintendent of construction for the Louisville Gas & Electric Co., who suffered a motor accident and was forced to postpone his engagement to speak at Rose.

President Prentice completed the morning program by expressing his admiration for his friend, Bill Clifford, who achieved the ideal of every American boy, that of rising to the top in his field. In paying his respects to a great man, President Prentice gave a short biographical sketch of Mr. Clifford which can be summarized by saying that due to hard work and straight-forward dealing with his fellowmen, he rose from the position of quarry boy at 50 cents a day to the ownership and presidency of the Woodbury Granite Company, the world's largest quarrying concern.

Holiday Journey

President Donald B. Prentice and Professor Carl Wischmeyer attended the yearly convocation of the American Society of Mechanical Engineers which was held in the administration building of the society in New York City, December 6 to 10.

President Prentice started early in order to accept an invitation to appear before the Rose Tech Club of Pittsburgh enroute to the meeting.

Both President Prentice and Professor Wischmeyer visited the Rose Tech Club of New York City.

On the return trip Professor Wischmeyer detrained at Schenectady, N. Y., where he presided at a dinner meeting given by the Rose Tech Club of that city. He also stopped at Cleveland, Ohio, for a luncheon meeting before entering on the last leg of his journey.

Debate Club

On Wednesday, December 8, the debating club at Rose held competitive trials in order to select a debate team for the year. Each orator presented a five-minute speech and was then required to refute some point selected at random by the judges, who were Mr. F. LeRoy Brown, coach; Professor John Bloxsome, organizer of the club; and Professor Herman Moench of the electrical engineering department.

The affirmative team for the year will be Joseph Dillahunt and Lawrence Giacoletto with Adrian MacFarland acting as alternate, while Robert Kahn and James Ducey will argue the negative side of the question with Riley Halstead, alternate. The squad will participate in the tourneys at DePauw and Manchester, and dual debates are usually arranged with Hanover, Oakland City College, Evansville, Indiana Law School, and Indiana State Teachers College. The season's debating will be centered around the statement, "Resolved, that the National Labor Relations Board should be empowered to enforce arbitration of all industrial disputes."

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Christmas Parties

Members of the faculty and their families were entertained at the annual Christmas party of the Rose Polytechnic Faculty Ladies' Club at Deming Hall.

Dinner was served at six-thirty o'clock, and a social evening was enjoyed. The committee in charge included Mmes. John L. Bloxsome, F. LeRoy Brown, William Crozier, Fred Genschmer, Edwin Mann, Donald B. Prentice, and John White.

On Wednesday, December 15, Mr. and Mrs. F. LeRoy Brown, of Deming Hall, presented the dormitory residents with a dinner party.

A. I. Ch. E.

A distinguished visitor, Dr. Jules Bebie, officer of the A.I.Ch.E. and well known in chemical circles, came to Rose Friday, December 17, and addressed the local branch of that organization while he was here.

Dr. Bebie, a native of Switzerland, graduated from the Federal Polytechnic of Zurich, Switzerland, and came to America in 1905. In the course of his education he studied with such famous men as Lunke and Treadwell. Treadwell is a disciple of the notable Dr. Bunsen of Germany. Since that time he has been continuously employed by the Monsanto Chemical Company of St. Louis, Missouri, one of the country's ranking manufacturers of organic chemicals.

Dr. Bebie recounted the early days with the Monsanto Company when the industry was little developed and such matters as specialization and unit operations were unknown. He vividly described how the cut-and-try method predominated, astute guessing perforce supplanting absolute surety since the fund of knowledge in those times was indeed sparse. During the World War, however, the American chemical industries were shaken from this lethargy and a rapid advance has since been maintained.

In conclusion, Dr. Bebie stressed the importance of the fundamental truths in building a trained specialist. He observed that characteristic loyalty, co-operation, methodicity, and the ability to concentrate on the subject at hand were most necessary to successful chemical engineers.

R. O. T. C.

The department of military science and tactics has announced the following promotions in the Rose unit of the R. O. T. C.: Norman G. Wittenbrock, Merton B. Scharenberg, Edward H. Eckerman, J. Allan Greenland, John R. Hayes, and Richard Dennis are promoted to the rank of Cadet First Lieutenant; Robert W. Underwood, George W. Smith, Merritt W. Noel, Robert N. Ladson, Franklin C. Doenges, and J. Ewing Ross are promoted to the rank of Cadet Staff Sergeant; and Norman G. Eder, Ernest J. Palisin, Vernon E. Whitehouse, David M. Huggins, John G. Appel, Stanley R. Craig, and John F. Kowinski are promoted to the rank of Cadet Corporal.

A. A. U. P.

On December 31 and January 1 the American Association of University Professors held its twenty-fourth annual meeting at the Claypool Hotel in Indianapolis. Professor Edwin W. Mann, president, of the Rose branch, represented it at the meeting along with several other members of the faculty.

At the same time the Association for the Advancement of Science was assembled and a number of excellent speakers appeared before the joint session. Professor A. J. Carlson, president of the A. A. U. P., gave an expertly administered chiding "So This Is the University?"

The most important factor making possible the high wage level of the United States is technical skill. As technical progress is made in low-wage countries engineers and research scientists in our industries must develop new materials, new machines and new methods to maintain our leadership. Without this leadership competition would soon destroy the wage advantage which our workmen enjoy. The importance of the engineer in our economic life is evident. The study of engineering is preparation for service of national significance.

ROSE POLYTECHNIC INSTITUTE

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ALUMNI NOTES

edited by Robert S. King. m., '40

The Alumni Department has the express purpose of reporting the activities of the alumni. It is hoped sincerely that this section has proved of interest to those for whom it was written. However, the success of this column lies not in the effort of your editor, but it is totally dependent upon you, the alumni. In order for alumni news to be printed, it must first be reported. Such information, sent directly by alumni, is the principal source of information for this column. Therefore, each of you can be of great assistance if you will keep the editor informed of your activities. Remember also that the conversion of news into history is rapid. The alumni editor wishes to express his appreciation to those who have assisted him by reporting alumni activities, for, without that help, this department could not have achieved whatever success may be accredited to it.

Rose Tech Club Meetings

On December 3rd, the Pittsburgh Rose Tech Club met for dinner at the University Club with Doctor Prentice as an honor guest. Reports were heard of current activities at the Institute. The officers for 1938 were elected as follows: Wiley, '98, president; and Ducey, '11, secretary. The following alumni were present: Barrett, '28; Briggs, '20; Butler, '10; Ducey, '11; Fing, '15; Frisz, '09; and Worthington, '06.

On December 9th, the New York Club met for dinner at the Advertising Club. Both Doctor Prentice and Professor Wischmeyer, who were in New York for the meeting of the American Society of Mechanical Engineers, attended this meeting. The following Alumni were in attendance: Andrick, '07; Beauchamp, '13; Blair, '30; Boehm, '91; Bruning, '21; Butler, '32; Corban, '24; Ferris, '27; Ferris, ex-'21; Hegarty, '15; Hickman, '11; Holding, '89; Holding, '94; Hubbell, '98; Kelsall, '06; Loehninger, '13; Madison, '13; Michel, '03; Miller, ex-'16; Moore, '20; Peddle, '05; Pirtle, '16; Reinking, '27; Shattuck, '36; Uhl, '08; Willison, '08; Wischmeyer, '37; and Wittenberg, '37. Hegarty, president of the New York Club, attempted to hold an election to select his successor, but was overruled and continues to hold office.

On the 10th of December, the Schenectady Rose Tech Club held a dinner meeting. Professor Wischmeyer and the following members were present: Averitt, '37; Davis, '92; Pfeif, '05; Sage, '07; Stimson, '31; Stineman, '37; Stokes, '10; Waters, '88; and Whitecotton, '07.

December 11, Professor Wischmeyer joined the Cleveland Rose Tech Club at a noon luncheon meeting, with the following members present: Canfield, '06; Cook, '05; Dodson, '29; Eastood, '06; Ehrenhardt, '30; Griepenstroh, '23; Griffith, '22; Hall, '35; Johnson, '23; Leisey, '23; Pettit, '03; Richardson, '31; Schwartz, '01; Tilley, '17; and Woody, '14.

Professor Wischmeyer, who attended each of these meetings reported them all to be enjoyable affairs. Many of the alumni inquired about Dr. White, Professors Faurot, Wickersham and McCormick, and sent their best regards to these men and to the members of the faculty.

Wedding

Announcement was received of the marriage of Mr. Harlan C. Johnson, son of Mrs. Muriel Johnson of 1125 South Twenty-fourth Street, to Miss Mary Lela Brown, daughter of Mr. and Mrs. George T. Brown of 1314 South Twenty-fifth Street, Terre Haute.

The wedding took place November 27 with the Reverend Virgil Hunt of the United Brethren Church officiating.

Mr. Johnson graduated from Rose in '34. He is employed at Carnegie-Illinois Steel Corporation of Gary as electrical test engineer.

Mr. and Mrs. Johnson will live at 717 Tyler Street, Gary, Ind.

Announcement

The news has drifted in that the Alfred Blickensderfers have a baby son born in September. Mr. Blickensderfer is a Rose graduate of '33.

Here and There With The Grads

'03 H. Edmund Wiedeman has been appointed as a member of the board of advisers of the Engineering School of Washington University in St. Louis.

'04 Irwin D. Toner, with Dri-Steam Valve Sales Corporation, has been transferred to Chicago.

'11 Philip A. Newhart has taken a position with the Carnegie-Illinois Steel Company.

'19 Frank F. Peker has gone to Louisville to assume a position with the Seagram Distillery.

'20 Walter L. Osmer is now sales manager for the Dix Lumber Company of Terre Haute.

'21 Robert R. Gilkison has taken a position with the Seagram Distillery at Louisville.

'24 Herbert M. Corban, with the Cities Service Oil Company, has been transferred to New York.

Samuel S. Forsythe is employed by the Sheffield Steel Corporation at Tulsa, Alaska.

'31 Richard J. Harris is now an inspector at the Port Terminal, Bayonne, N. J.

Allen Stimson, with General Electric, recently obtained a patent on an electromagnetic relay from the United States Patent Office. The patent was assigned to General Electric.

'32 Frank P. Butler is assistant operating manager for the Sperry Products Inc., Brooklyn, N. Y.

Abraham H. Goodman has been made assistant research director of the American Maize Co.

Clifton A. Pratt has taken a position with the engineering division of the Travelers Insurance Co. He is temporarily in Detroit.

Howard A. Staderman, with Iillinois-Bell Telephone Company, has been transferred to Winchester, where he is the district manager.

'35 John A. Bradley, with Standard Oil, has been transferred to Evansville.

Russell R. Kerr is junior engineer with K. A. Rarick Company, Inc., of Indianapolis.

Milton F. Kroesch is with the Pressed Steel Tank Company of Milwaukee.

'37 Stanley Cox is employed by the Wadsworth Electric Co. of Cincinnati.

Harry J. Halberstadt is with the International Business Machines Corporation at Endicott, N. Y.

James A. Hughes, with the International Business Machines Corporation, has been transferred to Toledo, Ohio.

John B. Stineman recently joined the General Electric Company as a student engineer and at present is located at Schenectady.

ex'40 Dick Davis plans to enter the Indiana Law School for the new semester.

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FRATERNITY NOTES

MARKS.

Alpha Tau Omega

On Friday, December 17, Indiana Gamma Gamma chapter of Alpha Tau Omega fraternity held its annual ball in honor of the yule season. The Mayflower Room of the Terre Haute House formed the setting for this function, to which the fraternity extended invitations to the faculty, fraternity members, pledges, and alumni.

Professor and Mrs. Carl Wischmeyer, Professor and Mrs. Clarence C. Knipmeyer, and Mr. and Mrs. Henry C. Gray acted as chaperones. Several other faculty members and their wives attended the dance as guests of the chapter.

Gamma Gamma wishes to congratulate the following members who received their football letters: Eckerman, Smith, Ladson, and Buis, who received a manager's letter.

Sigma Nu

Beta Upsilon chapter wishes to congratulate pledges Palison, McKee, Brittenbach, and Mitchell for earning major letters in football and Hayes for earning a senior manager's letter.

A dinner meeting of the chapter was held November 24 with Professor Moench, Dr. Baker, and Howey B. Hartsock as guests. Brother Hartsock, who is a prominent lawyer in Indianapolis, gave a very interesting talk.

Initiation services were held December 12, and Joseph A. Dillahunt and Richard A. Mullins became active members.

Beta Upsilon and the Theta Xi chapter held a joint spaghetti dinner and bridge party Friday, December 10. Several alumni were present, and the evening was enjoyed by all.

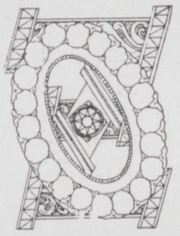
Theta Kappa Nu

Indiana Gamma chapter of Theta Kappa Nu fraternity held its monthly dinner on Sunday evening, December 12, at the King Lem Inn. Two guests were present from the Iowa Beta chapter at the University of Iowa.

On Christmas evening the chapter sponsored a Christmas Formal in the Junior ballroom of the Terre Haute House. The music was furnished by Warren Henderson's orchestra. Preceeding the dance the Alumni Club met at the chapter house to elect officers for the coming year. This meeting was well attended by forty of the "old-grads".

Indiana Gamma is pleased to announce the initiation of Robert W. Underwood. Bob was conducted into the active chapter on January 9.

Theta Xi



Kappa Chapter of Theta Xi considers the year of 1937 as a very eventful and successful year in the history of the chapter at Rose. The chapter looks forward to the new year with plans and prospects to make it an even more successful one.

The chapter wishes to congratulate Brother Stanfield on his success as captain of the past season's football squad.

Blue Key

At a special meeting on January 4 Blue Key discussed plans for an alumni registration booth at the Rose Show. A discussion was also held at this time concerning enforcement of the rules in the student lounge. Blue Key members will work in connection with the members of the student council to keep the students from abusing the lounge.

Blue Key takes great pleasure in announcing the initiation of John Wilson, Robert Kahn, Robert Ladson, George Smith, and Edward Spahr. The initiation was held at a dinner meeting at the

Elk's Club on January 13, 1938. The initiation and dinner were concluded with a short talk by Dr. Prentice.

Blue Key is looking forward to a successful year with these new men added to the organization.

The Progress of Science

Only recently has science been considered one of the important necessities in the life of a civilized country. Even at the end of the nineteenth century there were few scientists; a few men in a few countries revolutionized all the scientific knowledge of the world.

Their discoveries resulted in a development of technique in industry and caused a complete transformation of the conditions of life. One of the most striking features of this transformation was the establishment of rapid communication between all parts of the earth. Today no great economic or political event can occur anywhere without being known to the rest of the world in a very short time.

The extraordinary development of scientific research has come as a result of this development of technique and the liberal exchange of thought between scientists.

No scientist of our time is thoroughly acquainted with even one of the fundamental divisions of science. Modern laboratories, as well as the scientists themselves, must be specialized. Today there is great cooperation between the institutes of research, every member of which must have a general scientific education and a detailed knowledge of some branch of research.

The increasing number of young scientists needed in the laboratories must be found among the students in the universities, and in the teachers' and engineering colleges. The problem of recruiting such students is a difficult one. The scientific worth of a student is not insured by his success in examinations but by his ability in the laboratory.

Small scholarships are needed in order that the promising young students may receive university training. Other scholarships must be provided so that some of them can determine their capacity for scientific work. Those who find themselves not fitted for pure research can take up teaching or technical work.

For those who succeed, situations must be provided as well as money for the expenses of their work and opportunities for working in different laboratories. Attempts have been made in several countries to create such an organization, but there is much to be done, and each nation must cooperate to solve this great problem of international importance, the progress of science.

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Humor

edited by

James E. Ducey,
ch., '40

"What have you done?" St. Peter asked,
"That I should admit you here?"
"I edited a Joke Page," I gravely said,
"Of my college for one long year."
St. Peter pityingly shook his head
And quietly touched the bell.
"Come in, poor thing, select a harp,
You've had your share of hell."

"You ain't no gentleman."
"You ain't no blonde."

—*Exchange.*

Maiden's Prayer

Breathes there a man
Around this school
Sufficiently
Restrained and cool,
Enough to limit
His demands
And say "Good night,"
Just holding hands,
Who has the decency
To wait
Until at least
A second date
To reach a warm,
Romantic state
And give a girl
Some preparation
Before expecting
Osculation
At least an hour
In duration?
If such there be
Go mark him well,
I'll date the guy
And make him tell
Me what the hell
He had for dinner, that makes him
—so sick.—*Reserve Red Cat.*

The story is told of the Kentucky colonel who had an argument with the devil. The devil said that no one had a perfect memory. But the colonel maintained that there was an Indian on his plantation who never forgot anything. The colonel agreed to forfeit his soul to the devil if the Indian ever forgot anything.

The devil went up to the Indian and said: "Do you like eggs?"

The Indian replied, "Yes." The devil went away.

Twenty years later the colonel died. The devil thought, "Aha, here's my chance." He came back to earth and presented himself before the Indian. Raising his hand, he gave the tribal salutation, "How?"

Quick as a wink the Indian replied, "Fried."

—*The De Laval Monthly.*

Little girl to policeman: "Can I trust you?"

Copper: "What?"

L. G.: "Can I trust you?"

Copper: "Why certainly, all little girls can trust policemen."

L. G.: "All right then, please button my panties."

—*Widow.*

Attention: Sophomore Basics

French sentry: "Halt! Who goes there?"

Voice: "American."

French sentry: "Advance and recite The Star Spangled Banner."

Voice: "I don't know it."

French sentry: "Proceed, American."

—*Puppet.*

A Tale of an Engineer's Love

An engineer once loved a maid
With pure dynamic passion;
His "modus Operandi" was
In scientific fashion.
The sine waves of her lovely hair
Set symphonies afloat,
These undulations simply struck
His fundamental note.
No longer could he hold his love
(His urge to merge was great)
And so he screwed his courage up
And thus to her he spake:
Oh, maid of undulations sweet,
Come give me but one kiss,
React forever thus with me
In osculating bliss.
Our days will pass in rapture by
With sweet synthetic thrills,
With kilowatts and B.T.U.'s
We'll pay our grocery bills.
We'll dyne upon the best of food
The kind that's strictly stable,
And soft boiled eggs we'll eat
From off a logarithmic table.
We'll build a modernistic ohm
Beside the sounding sea,
And raise a tribe of engineers—
and lawyers
With vim and entropy.
Oh: watt a maid: Come be my
bride
Illuminate my days,
Let's synchronize our voltages
And fluctuate in phase.
Our modest maid remained unswayed
By all this talk fanatic,
In fact, her accents I would say,
Were cold and autocratic.
Your pretty plea is packed with
power
But leaves me undelighted;
It only proves, my dynamo,
You're running self excited.

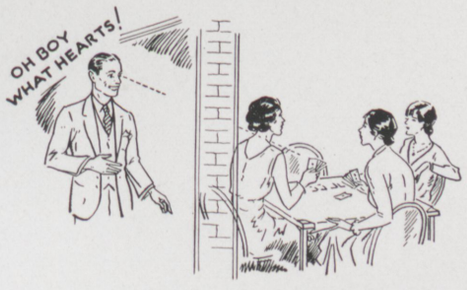
G-E *Campus News*

NETWORK ANALYZER

WITH the aim of aiding public utilities in laying out power systems, R. N. Slinger, Oregon State '26, R. G. Lorraine, U. of Colorado '27, and H. P. Kuehni, Eidgen Technische Hochschule '20, Zurich, Switzerland, Union '29, spent more than a year in designing and constructing an alternating-current network analyzer. The apparatus is so arranged that any distribution circuit in the country may be simulated merely by plugging various impedance units and power sources from the plugging cabinets

and reading the results on the master instrument panel.

The a-c analyzer, a miniature power system, provides General Electric engineers with an advanced tool for system analysis and is made available to utility operating companies for their individual problems. Speed and accuracy of calculations are the two main advantages of the analyzer, and any experienced operator can, in two or three days, solve network problems which would take months to work out using other methods.

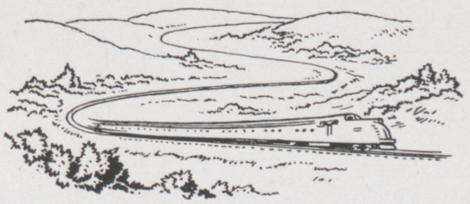


LOOKING THROUGH A BRICK WALL

LOOKING through a brick wall would not be a practical use for the G-E industrial x-ray machine, but it would be less difficult than the tasks to which it is put every day. Developed for use in factories where expensive castings and machined parts must be inspected, the x-ray permits inspection for flaws in castings and welds without damage to the article under observation.

The industrial x-ray machine is, in reality, an enlargement of the familiar machine used by doctors and dentists. Mounted on a dolly, or suspended from a hand crane, the machine is easily transported from one job to another and can be quickly set up for the inspection, saving time and money and assuring the customer of a perfect casting or welded seam.

Developments such as this are being made by college graduates who were at one time "on Test." Many of them have been off the college campus but a few years and are entering a career in one of the many engineering and business fields in the General Electric Company.



RUBBER RAILROAD RAILS

NO, the railroad companies have not started to use rubber rails, but the new welded steel rails that are a mile in length have many of the characteristics which rubber rails probably would have. Developed after research and experimental work by the Delaware and Hudson Railroad, Sperry Products Company, and General Electric Company, the welding which makes possible these mile-long rails introduces flash butt welding of the preheated ends of regular-length rails to form one long continuous rail.

When these rails are loaded on flatcars, they bend easily around the sharpest curves as they are carried to the spot where they are to be laid. In addition to their flexibility, the rails are remarkably quiet. No longer will there be the continual bump and clatter of wheels over worn and gaping rail joints to disturb sleeping passengers. To reduce the noise even more, the rails are laid so that there will be no two parallel joints.

The flexibility and smoothness of the new rails reduce the wear and tear on the rolling stock, so that the initial expenditure for the rails will be compensated by the saving on maintenance.

GENERAL ELECTRIC

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